CENTRALIZED CLUSTERING MODEL FOR LARGE SCALE WIRELESS SENSOR NETWORKS

Ch.Priyanka[1], Dr. K. Subba Rao[2]
[1]PG Scholor, [2]Professor
[1,2]BVRIT, Narsapur, Medak,India

ABSTRACT

Wireless Sensor Networks are widely used in all over the world like in army for secure data gathering and transmission, industries to monitor the tools and monitoring the condition, Urban Areas, Health Care Centres, construction field and marine environment. When there is a demand it is essential to maintain the network and sensor nodes properly. For that the best approach is clustering which divides the sensor nodes in form of groups and balance their workload. Basically, clustering is very difficult task where we need to form the groups, selecting the cluster head and maintaining the cluster member and gathering the data from all cluster heads without loss of data. In this approach, cluster head selection is most troublesome task which decides the robustness of the cluster. Here we are introducing a novel method Centralized Clustering for selecting Local Cluster Head (LCH) and Global Cluster Head (GCH). Global cluster head is selected based on power efficiency and bandwidth. The purpose of LCH is to maintain the cluster members and their details like id, neighbors, distance and battery capacity.

Keywords: Wireless Sensor Network, Clustering, Centralized Model, Local Cluster Head, Global Cluster Head.

I INTRODUCTION

In Wireless Sensor Networks transferring information through the sensor nodes from source to destination is a difficult task, when number of nodes is increased in the network. For maintaining the network and to monitor the sensor nodes we need one approach which is called clustering. Cluster means group of members with similar properties. In clustering we will identify the nodes with similar properties and make them as a single group and monitor by selecting one cluster head. The main responsibility of cluster head is to monitor the working functionality of cluster members, how they are reacting for hazardous conditions, and are they gathering the data through sensors properly, are they transmitting the entire data reliably, and their battery level. So we are proposing a robust clustering mechanism named "Centralized Clustering" which reduces the maintenance cost, improve the overall performance of the network. It gathers and transmits the sensor data from cluster to substation reliably. This Entire Centralized Clustering Mechanism is shown in below figure Fig:1

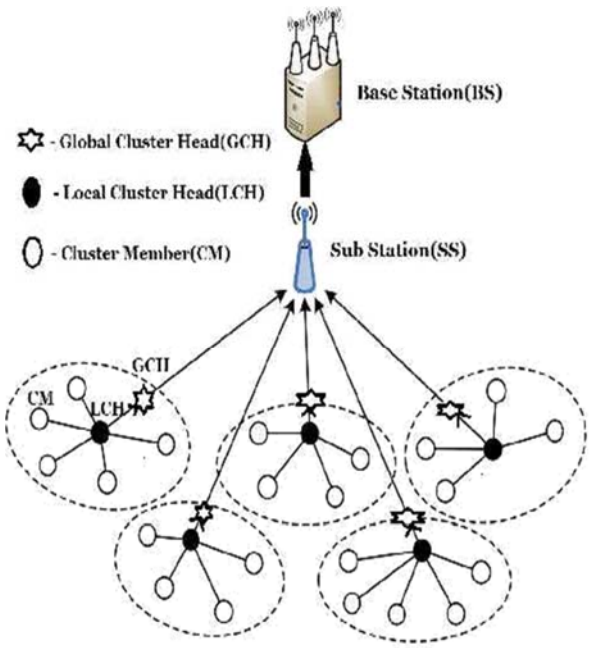

Fig: 1 Centralized Clustering Mechanism

2. LITERATURE SURVEY

The fundamental method of clustering is grouping the sensor nodes in the form of clusters and selecting one of the cluster members as cluster head and it will take care of the responsibilities like monitoring, scheduling and gathering the data from sensor nodes. In this existing system, the cluster head gets
Over loaded when number of nodes is steeply increased in the cluster based on size of the network. So that we are proposing a novel clustering model which enhance the performance of the cluster as well as entire network. It reduces the burden of cluster head which divides the task into two parts. Part 1: Gathering Part 2: Transmitting. For this we will adopt two cluster heads from the cluster members, named Global Cluster Head (GCH) and Local Cluster Head (LCH). The main duty of LCH is to monitor and gather the sensor data from the cluster members and then GCH will transmit the data to the substation securely. This proposed method will reduce the overhead of the cluster head.

3. NEW METHOD TO IMPROVE THE CLUSTRING MECHANISM:

The main goal of this new approach is to reduce the overload of Cluster Heads in Clustering by dividing the responsibilities and distributing the work. The main problem in Wireless Sensor Networks is to gather and transfer the data reliably. For this it employs clustering mechanism where each cluster head should monitor the cluster members in case of battery level, working condition, sensing capacity, behaviour, gathering the data and need to transmit the data securely. This method is practically very difficult to implement in large scale networks. So to reduce the overhead we are introducing the novel method which distributes the load. The main outcomes of the method are reliable and secure data transmission and controlled energy consumption.
The Total Clustering Mechanism is based on the "Cluster Chain Structure".

This Cluster Chain Structure is contains nodes Node1, Node2, Node3, Node4, Node5, Node6,Node n-1,Node n and Cluster Sink. This nodes and Cluster Sink are connected is shown in the below Fig:2

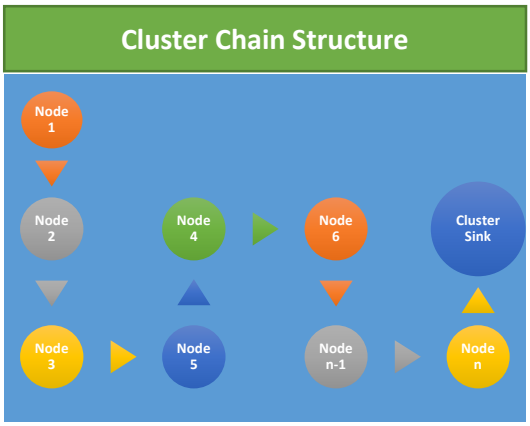

Fig:2 Cluster Chain Structure

The proposed algorithm is

Algorithm Steps:-

1. Each Node will create the data.
2. Consider the sensor network where G (V, E). Where V is no of vertices in a network considered as sensor nodes and E is wireless links between vertices.
3. List out the no of nodes in the network and arrange them in the process that nodes with similar properties like battery, capacity, bandwidth, and storage capacity.
4. Group the sensor nodes where each cluster must contain all types of nodes of categories like high battery, sensor nodes with solar energy, high data storage, etc.,
5. After clustering the all nodes in network as we mentioned above, initially we should select two cluster heads one GCH (Global Cluster Head) and LCH (Local Cluster Head) who have high battery power and high sensing capability.
6. Here each node needs not to maintain the table like neighbouring nodes, distance, and battery. Each and everything about cluster nodes will maintain by LCH.
7. The duty of LCH is to maintain the database of all cluster members like their neighbouring nodes, their capacity, batter power and distance. In case GCH have the problem like low battery or in case of termination LCH will swap or replace the GCH with cluster members.
8. LCH will gather the sensor data from the cluster members at once by using parallel algorithm.
9. LCH will transmit the data to GCH where GCH encrypt the entire data and transmit to the Sub Station with single dynamic

key. Sub Station will transmit to Main Station and Main Station will transmit to the destination.

10. Stop.

This Algorithm contains five modules. And these five modules are briefly described in given below.

Module 1

Let us assume that G (V, E) represents the sensor network where V denotes the set of vertices and E denotes the set of edges from the pair of vertices in the set V. Vertices are represented as sensor nodes and Edges are wireless links between nodes. Each vertex will gather the data and stores in internal storage. For maintenance of power every node will have the solar energy by using solar panel included in it.

Module 2

Division of 'n' number of nodes into 'm' number of self organized clusters is the main task which divides the all sensor nodes into multiple clusters based on distance and battery capacity and features of the node. We divide cluster based on similarity of properties of nodes and also based on battery capacity initially we need to select the cluster head. Each node should maintain a table which contains details of neighbouring nodes like battery, distance and other properties of nodes.

Module 3

Initially Select Local Cluster Heads 'L' (L1, L2, L3….) and Global Cluster Heads 'G'(G1, G2, G3...) for each cluster, based on Energy or Battery of the nodes. The main duty of LCH is to maintain the cluster members' details in the form of table like neighbouring nodes, id, battery life, and distance etc. LCH have the authority to swap the GCH with cluster members in case of misbehaviour or low battery. The main role of GCH is toreceive and transferring the data from LCH to Substation. These approached will applicable to all cluster in network which is also known as "Centralized Clustering Mechanism".

Module 4

Data gathering and Encrypt the data by using parallel gathering approach. Local Cluster Head will gather the data from nodes (Parallel gathering) and then integrate the data by using top down or bottom up approach and filter the data and sort to arrange the packets in proper order. Convert in Noise by using pseudo random code and Spread spectrum Technique. Encrypt the Noise by using RC4 Encryption Algorithm. Then encrypted data will transmit to the Global Cluster Head reliably

Module 5

Final step in the proposed approach is to transmit the encrypted data to the sub \-station. Then it will transmit to the main station. In main station we will evaluated the data after decryption and send the signal to the destination.

4. ADVANTAGES OF PROPOSED MODEL

a) Minimum Power Consumption when compared to existing proposals
b) Reliable and secured data transmission.
c) Reduction of Cluster Head overload.
d) Best cluster maintenance system.
e) Less control message transmission which leads to minimum power utilization

5. CONCLUSION AND FUTURE PLAN

In the proposed system we are introducing the novel method which improves the overall performance of the clustering mechanism in wireless sensor networks. Each node maintaining the table about the adjacent nodes, distance is burden to nodes which will take care of by the LCH. We can add other feature like making inactive each individual node in cluster and making active which is transmitting the data to the local cluster head. We can generate only one dynamic key for encryption and decryption and for entire transmission process which leads to less message and acknowledgment transmission automatically reduces the power consumption

6. REFERENCES

1. Djuraev Mamurjon, Byoungchul Ahn, "A Novel Data Gathering Method for Large Wireless Sensor Networks" 2013 International Conference on Electronic Engineering and Computers cience, IERI Procedia 4 (2013) 288 – 294.

2. Morteza Mohammadi Zanjireh, Hadi Larijani "A Survey on Centralised and Distributed Clustering Routing Algorithms for WSNs" Conference Paper - May 2015

3. J. Nithya, J. Shenbagam "Efficient Anchor Point Selection Based Data Gathering in Cluster Wireless Sensor Networks" International Journal of Innovative Research in Computer

andCommunication Engineering, Vol. 3, Issue 10, October 2015.

4 Ko-Ming Chiu, Jing-Sin Liu*, Shih-Rong Yang "Robot Routing Using Clustering-BasedParallel Genetic Algorithm with Migration", Journal of Communications Engineering andNetworks, Apr. 2014, Vol. 2 Iss. 2, PP. 71-83.

5 Sanjeev Kumar Gupta, Neeraj Jain, Poonam Sinha, " Clustering Protocols in Wireless Sensor Networks: A Survey" , International Journal of Applied Information Systems (IJAIS) – ISSN : 2249-0868 Foundation of Computer Science FCS, New York, USA Volume5–No.2, January 2013 – www.ijais.org

6 K.Ramesh and Dr. K.Somasundaram "A Comparative Study Of Cluster head SelectionAlgorithms In Wireless Sensor Networks" International Journal of Computer Science &Engineering Survey (IJCSES) Vol.2, No.4, November 2011.

7 Li, Qiao; Cui, Lingguo; Zhang, Baihai; Fan, Zhun "A Low Energy Intelligent Clustering Protocol for Wireless Sensor Network" IEEE International Conference on IndustrialTechnology.

8 S.Sanjeeva Rayudu, Dr.S.Madhavi, "Power Efficient and Robust Ubiquitous Sensor Networks" – IARJSET- 2015

9 Takehiro Furuta, Mihiro Sasaki, Atsuo Suzuki, "A New Clustering Model Of Wireless Sensor Networks Using Facility Location Theory" Journal of the Operations Research Society of Japan 2009, Vol. 52, No. 4, 366-376.

10 Vitthal Yenkar, Dinesh Datar, "Transmission Efficient Data Gathering Using Compressive Sensing In Wireless Sensor Network" IJIRCCE, Vol. 3, Issue 4, April 2015.

11. A.MeenaKowshalya, A. Sukanya, "Clustering Algorithms For Heterogeneous Wireless Sensor Networks – A Brief Survey" International Journal of Ad hoc, Sensor & Ubiquitous Computing(IJASUC) Vol.2, No.3, September 2011.

12. Hui Jing and Hitoshi Aida , pages 157-172,"Cooperative Clustering Algorithms for Wireless Sensor Networks".

13. Raluca Marin-Perianu, Hans Scholten, Paul Havinga and Pieter Hartel "PerformanceEvaluation of a Cluster-Based Service Discovery Protocol for Heterogeneous Wireless SensorNetworks".

14. Maryam Soleimani, Amirali Sharifian, Ali Fanian "An Energy-Efficient Clustering Algorithm for Large Scale Wireless Sensor Networks" 978-1-4673-5634-3/13/$3l.00 ©2013 IEEE.

15. Hassan Echoukairi, Amine Kada1, Khalid Bouragba, Mohammed Ouzzif , "Effect of MobilityModels on Performance of Novel Centralized Clustering Approach based on K-means forWireless Sensor Networks", International Journal of Applied Engineering Research ISSN0973-4562 Volume 12, Number 10 (2017) pp. 2575-2580.

16. Mekkaoui Kheireddine, Rahmoun Abdellatif, Gianluigi Ferrari, "Genetic CentralizedDynamic Clustering in Wireless Sensor Networks" I. J. Computer Network and Information Security, 2015, 8, 1-8

17 Arif Sari, "Two-Tier Hierarchical Cluster Based Topology in Wireless Sensor Networks for Contention Based Protocol Suite" Int. J. Communications, Network and System Sciences, 2015, 8, 29-42.

18 M.Srinivasa Rao and K.Durga Bhavani "An Efficient Centralized Clustering approach for Wireless Sensor Networks" M.Srinivasa Rao et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 6 (1) , 2015, 925-930.

19 Kunal G, S. Manasa, "An Efficient EM-algorithm for Big data in Wireless Sensor Network using Mobile Sink" Kunal G. S et al, / (IJCSIT) International Journal of Computer Scienceand Information Technologies, Vol. 7 (5) , 2016, 2201-2205.

20 Noritaka Shigei, Hiromi Miyajima, Hiroki Morishita, Michiharu Maeda "Centralized and Distributed Clustering Methods for Energy Efficient Wireless Sensor Networks" Proceedings of the International MultiConference of Engineers and Computer Scientists 2009 Vol I IMECS 2009, March 18 - 20, 2009, Hong Kong.

21 Ying Zhang, Jun Wang, Dezhi Han, Huafeng Wu, and Rundong Zhou "Fuzzy-Logic Based Distributed Energy-Efficient Clustering Algorithm for Wireless Sensor Networks" MDPI, Published: 3 July 2017.

22 Adeniran Oluwaranti, Dauda Ayanda "Performance Analysis of an Enhanced Load Balancing scheme for Wireless Sensor Networks", Wireless Sensor Network, 2011, 3,275-282